U.S. EPA Environmental Technology Verification Program
Advanced Monitoring Systems Center

Air Stakeholder Committee Meeting

October 18 and 19, 2001
Seattle, Washington

DRAFT MEETING MINUTES

ATTENDEES

Stakeholder Committee Members:
Ernest Bouffard, Connecticut Department of Environmental Protection
Judy Chow, Desert Research Institute
Jeff Cook, California Air Resources Board
Rudy Eden, South Coast Air Quality Management District
Clifford Glowacki, Technikon, LLC
Tim Hanley, U.S. EPA/OAQPS
Peter Mueller, TropoChem
Roy Owens, Owens Corning
Lindene Patton, Zurich North American
Steve Priebe, Idaho National Engineering and Environmental Laboratory
Donald Stedman, University of Denver
Susan Wierman, Mid-Atlantic Regional Air Management Association

Observers:
Andrew McFarland, Texas A&M University
Toru Esaki, Mitsubishi Research Institute, Inc.
Robert Kotchenruther, EPA Region 10
Scott Downey, EPA Region 10

EPA/Battelle AMS Center Staff:
Robert Fuerst, EPA/ORD/NERL
Teresa Harten, EPA/ETV
Liz Hunike, EPA/ORD/NERL
Gretchen Hund, Battelle
Tom Kelly, Battelle
Karen Riggs, Battelle

Guest Speakers:
Keith Rose, EPA Region 10
Mike Gilroy, Puget Sound Air Pollution Control Authority
John Williamson, WA Department of Ecology
David Welsh, Northwest Environmental Business Council

October 18, 2001

Welcoming, Agenda, and Meeting Objectives

Karen Riggs, the Battelle Project Manager for the ETV Advanced Monitoring System (AMS) Center, welcomed the committee stakeholders and observers and outlined the following objectives for the meeting:

- Meet the new ETV Program Director
- Update on and provide input to AMS Center current verification tests
- Understand regional air monitoring activities and needs
- Explore improvements to ETV process
- Identify future technologies for verification.

Stakeholder Insights since the Last Meeting

Gretchen Hund asked the full group to report on what their network has to say about ETV and specifically whether ETV's visibility seems to be improving or not.

Lindene Patton represents insurance warranties and mentioned that they have found ETV critical, particularly in the hazardous waste treatment technology area.

Roy Owens mentioned that he has tried to spread the word at conferences (like AWMA) by talking to vendors that have come by his booth.

Jeff Cook said that the Fresno verification test on ambient fine particulate monitors got a lot of attention and he thinks there is broad knowledge about ETV but at the local district meeting level and EPA Region 9 awareness is lacking.

Tim Hanley mentioned that he does spread the word about ETV; people have been calling him about the tests in Pittsburgh and in Fresno. He said that getting information to potential users of the technology is what is critical and that ETV shouldn't be worried about every vendor being happy, particularly given that some vendors just won't be happy if their technology did not perform well.

Susan Wierman gives updates at her MARAMA meetings. She said that her network found the performance data on NO/NO_2 emission analyzers very useful and expects that the PM data will be very well received once it is released. Region 3 mentioned that they would like automated ozone monitoring to minimize the expenses to the network by having things more automated. She sees organics being increasingly more important.

Cliff Glowacki mentioned that only 4% of HAPs are removed in baghouses and that there is a need to speciate HAPs that are being emitted, particularly from foundries. He mentioned that his organization is focused on the most critical 70 HAPs. He plans to approach the National Environmental Laboratory Accreditation Program (with state and local regulators and

representatives from American Indian tribal governments) to inform them about ETV. In December they meet in Washington, D.C. and in June 2002 they meet in Florida.

Peter Mueller is working to bring ETV to the attention of the atmospheric aerosol community.

Andy McFarland mentioned that he sees a need for ETV in verifying technologies that take stack data.

Rudy Eden emphasized the need to better market ETV.

Ernie Bouffard reported that the New England Governors Conference (NEGC) has been very active with ETV over the past six months. Through NEGC support, Ernie and other regulators from New England have been involved in the mercury CEM test. John Shea from NEGC has also been involved in other ETV activities outside of the AMS and working to increase ETV awareness in New England. Ernie is also involved in the planning for the future ammonia slip and is spreading the word about ETV to relevant parties. Ernie plans to report on this meeting at his next Region 1 meeting.

Judy Chow finds ETV important and says that it is helping to move customers toward continuous monitors instead of mainly using standard instruments. She offered to work with Battelle to get them involved in a monitoring session at the next AWMA annual conference.

Tom Kelly from Battelle reported that he has seen a change in that vendors are coming to Battelle without being first contacted by Battelle.

Observer, Mike Gilroy, said that he is grateful that there is a group like ETV but he was unaware of it until he was invited. Observer Scott Downing from EPA Region 10 mentioned the need he sees to get real-time data to the public on wildfires burning.

ETV Program Update, Accomplishments, and Future

Teresa Harten, the new program director for ETV, reported that the ETV website is the fourth most popular website at EPA. ETV makes a point to participate in 30 conferences a year as another avenue for reaching people. Its six Centers (with AMS being one of them) are other strong avenues for getting the word out on ETV.

As of Oct. 2001, 164 technologies have been verified through ETV. Forty percent of the vendors participating felt that it took too long to get their verification statement. Several stakeholders commented that they thought this figure wasn't unreasonably high and were surprised that it wasn't higher since most vendors want a marketing piece they can use immediately. Seventy-five percent of the vendors who responded said that they would submit another technology. Ninety-two percent said that they would recommend ETV to others.

The ETV Centers are:

- ETV Advanced Monitoring Systems Center

- ETV Air Pollution Control Technology Center (covering both stationary and mobile sources)
- ETV Greenhouse Gas Prevention Technology Center
- ETV Drinking Water Systems Center
- ETV Water Protection Technology Center
- ETV P^2, Recycling and Waste Treatment System Center (looking at both technologies and products).

Teresa reiterated ETV's values and quality criteria:

Fairness:

1. Testing needs to be available to all vendors who have commercial-ready technology within defined categories

Credibility:

2. Objective third-party tester
3. Pre-existing protocols / test plans need to be publicly available and capable of reproduction

Transparency:

4. Public availability of methods and results

Quality:

5. Quality management and data of acceptable level for verification.

Recently ETV has had more interactions with foreign countries interested in starting an ETV program. ETV representatives attended a workshop in India in September 2001. Other interested parties have been:

- United Nations Environment Program
- Organization for Economic Cooperation and Development
- Asian Pacific Economic Cooperation Group
- World Bank and United Nations (greenhouse gas)
- World Health Organization (water)
- State Department and Agency for International Development
- Bi-lateral discussions with many nations.

Teresa feels that the two critical questions confronting ETV for the years 2001-2006 are:

1. Can technology verification prove valuable in spreading the use of better technology around the world?
2. Will new and better technology continue to emerge from the private sector for verification?

ETV will also emphasize outcomes versus output in the future. One area where ETV feels it can do more is to strengthen partnerships (among the federal government, states, and private sector). EPA needs to be involved in ETV, and it is likely that ETV would not be viable without EPA's participation. Teresa is interested in seeing ETV better support sustainability by taking a system approach, considering multimedia approaches and impacts. One area for ETV to possibly include is technology categories that support market incentives (e.g., tradeable credits and other market instruments). Other areas to consider including are community-based environmental protection, growth management, and modeling.

EPA's Science Advisory Board (SAB) has reviewed ETV. The SAB stressed its support of the stakeholder process being used by ETV. It did encourage ETV Centers to have a broader representation on their stakeholder committees (e.g., environmental groups and financiers). Stakeholders did respond that the AMS Center did have financiers on its committee and that by looking at deposition of contaminants (like mercury) in water and through the air the AMS Center was looking at multimedia pathways and impacts to some degree.

Verification Status of Ambient Fine Particulate Monitors

Tom Kelly from Battelle reported on the results of the second stage in this test. The first stage was held in Pittsburgh, PA in August 2000. The second stage was held in Fresno, CA in December to January 2001. These two sites have very different particle concentrations and particle compositions.

Several stakeholders commented on how pleased they are that information on these continuous monitors is going to be made public so that purchasers of such systems can make informed decisions. Stakeholders felt that because of the sheer number of units verified (13), it would help to have critical figures of performance highlighted on the verification statement to help users compare and contrast them so that they don't have to read through the full verification reports. One stakeholder commented that the protocol developed was unprecedented. Another stakeholder thought that the Federal Reference Method (FRM) may be revisited in 2005 or 2006 and these data could be used in affecting decisions about selecting the method of choice.

Air Quality Monitoring: A Regional Perspective

Keith Rose from EPA Region 10 set the stage for the talks presented on air monitoring programs in the Pacific Northwest. He first gave an overview of EPA's national air monitoring strategy. He listed the following topics as critical in the strategy:

- Major reduction in criteria pollutant network (PM_{10}, CO, SO_2, and NO_2)
- Limited reduction in O_3 monitoring with emphasis on modeling
- Moderate reduction in $PM_{2.5}$ network with emphasis on replacing a portion of the FRM monitors with continuous monitors to reduce operational and maintenance costs
- Shift from mostly urban monitoring to a balance between urban and rural monitoring
- Initiate air toxics monitoring in major metropolitan areas as the first phase of a national air toxics monitoring program.

Keith mentioned that he sees the $PM_{2.5}$ network reducing because three years of data are needed and they have generally reached that. The region is starting to implement an air toxics program and Seattle is targeted as one of two cities. He reported on three trends he sees in $PM_{2.5}$ monitoring. First, the region is supplementing its existing FRM monitoring network with co-located continuous monitors to measure short-term elevated levels from agriculture burnings, prescribed forest burnings, and wildfires. Second, they collect continuous data from rural and remote sites to put the air quality index (AQI) on the Internet to inform the public of current air

quality. Third, they have increased $PM_{2.5}$ speciation monitoring (anions, cations, organic carbon, elemental carbon, and metals) in urban areas (e.g., Boise, Seattle, and Portland) to understand what compounds are making up these urban particles.

The needs the region has in the area of $PM_{2.5}$ are to:

- Conduct field tests to identify a continuous monitoring system with high correlation to an FRM monitor to identify a "regional equivalent" monitor,
- Develop cost-effective techniques to acquire real-time data from remote monitoring sites to post the AQI on the Internet,
- Develop an affordable, rugged, particle size analyzer capable of measuring chemical speciation and particle sizes down to 0.1 micron to help identify PM sources.

Goals of their air toxics monitoring program are to:

- Focus on monitoring 33 high priority urban hazardous air pollutants (UHAPS) out of the 178 in major cities,
- Measure seasonal and spatial variability of air toxics in major urban areas,
- Provide data to support and evaluate air toxics dispersion models (ASPEN) by county level. (They have yet to verify performance on a smaller scale.),
- Characterize population exposure to air toxics (at six sites) to estimate potential health risks and support development standards.

They have two pilot air toxics monitoring projects (in Seattle and Portland). Sources of concern include industrial, mobile, wood burning, and area sources. Sampling occurs every sixth day and includes VOCs, carbonyls, and metals. By 2003, the National Urban Air Toxics Network hopes to develop long-term monitoring plans based on data analysis and modeling results from the network and by 2005 complete implementation of the network.

Keith ended his presentation by reporting on the region's air toxics monitoring technology needs as being open-path continuous absorption spectrometers that can measure ambient air concentrations of VOCs, carbonyls, and PAH compounds. Keith noted that current open-path monitoring systems (e.g., DOAS and FTIR) don't have good enough sensitivity to measure a wide range of toxic compounds at ambient concentrations. One stakeholder suggested that asbestos measurements in ambient air might be an area for ETV to consider (particularly given the issue it was at the World Trade Center site).

Continuous Air Monitoring in the Puget Sound Basin

Mike Gilroy from the Puget Sound Air Pollution Control Authority described the program being used in the Puget Sound region. Mike stressed that the region is a diverse air shed and that particulate matter is the primary driver of the AQI due largely to mobile sources and wood smoke. Summer ozone is generally only an issue 5-7 days over the summer and PM normally dominates AQI during smog events.

Mike's agency operates 11 monitoring sites (PM_{10}, $PM_{2.5}$, and nephelometer data). He provides AQI reporting and forecasting services for Seattle and Tacoma. His agency also provides about

half of all of Washington State's fine particulate FRM data and over half of the state's real-time $PM_{2.5}$ data. Mike's agency has the largest data base in the country of $PM_{2.5}$ data.

Seasonal and meteorological differences are very important in choosing an appropriate monitoring technology. He stressed that while he found the data from the ETV verification test on ambient fine particulate monitors very thorough and interesting, it would not provide him the data he would need to make a technology selection for Puget Sound. He would have to see how the devices operated under Puget Sound conditions first.

Mike stressed the importance of consistency in operating and maintaining a monitoring network. He has three FTEs responsible for this and two responsible for data analysis and quality assurance. He recommended using technologies that well match the conditions they are going to be under.

MIke posed the question whether continuous monitors can be effectively used in the AQI programs in providing real-time characterizations of predictions of $PM_{2.5}$ levels. He showed extensive data using data quality objectives and models for relating FRM and continuous $PM_{2.5}$ measurements to report AQI. It was clear that it was possible if a regional approach is used to calibrate the devices. Continuous data can also describe trends of short-term events that would be missed if only using the FRM. He therefore can do rolling 24-hour forecasts. He finds continuous monitors as an efficient alternative to traditional methods.

Mike recommends that new guidelines be created to support and expand the collection of fine particulate data with continuous monitors while refining the FRM network. He'd like to see the use of nephelometers encouraged, given that they are reasonably priced and if well-calibrated can provide good data. Finally, he would like to see continuous $PM_{2.5}$ data incorporated into the national trends data set.

Air Toxics Monitoring in the Northwest

John Williamson from Washington State's Department of Ecology spoke next about air toxics monitoring in the state. What have been used are manual methods where samples are collected every six days concurrent with speciation monitoring. The state uses the TO-14A method for measuring VOCs where air samples in canisters are analyzed using a gas chromatograph. The TO-11A method is used for carbonyls where an adsorbent cartridge is used followed by high performance liquid chromatography and analysis. For metals, the IO-35 method is used. Automated continuous methods with appropriate sensitivity are needed. They have had some problem with DOAS and LIDAR in accurately detecting contaminants.

National Monitoring Update for Air: What's Coming?

Tim Hanley from EPA gave this update. He referred the group to Keith Rose's earlier talk that covered the National Monitoring Strategy for the agency. The three key monitoring areas are particles; ozone and pollutants that contribute to the formation of ozone; and air toxics. He

would like to see the network more useful than it is. He feels that the filter-based methods are a burden on the states and would like to see more continuous monitors used but recognizes that they can't be used for measuring for attainment. The states will always need both. Tim would like to see a Data Quality Objectives (DQOs) approach used where DQOs would be used to define performance-based criteria for acceptance of methods.

EPA is looking into replacing the FRM with regional equivalent monitors (REMs) and correlated acceptable continuous (CAC) monitors that would be more flexible in approval than REMs for areas where the annual average is low. The CACs would be used to help paint the picture and fill in the gaps for the whole country. Tim sees EPA moving toward a hybrid network where a minimal number of FRMs would be retained but states would be allowed to also use continuous monitors.

Tim talked about requiring precision of 20%, for $PM_{2.5}$ measurements, with bias (i.e., accuracy) or 10%. He again acknowledged that the FRM is needed to make attainment decisions. Tim thinks these changes to move toward a hybrid approach will occur in the first quarter of 2003.

Verification Status of Mercury CEMs (Phase 1 and 2)

Tom Kelly from Battelle reported that the first phase of this test was completed in January 2001 (as was reported at the previous stakeholder meeting in the Spring). The Ontario Hydro Method was used to correlate the results. The instruments tested measure some combination of elemental, oxidized, and total mercury. None of the instruments make a particulate mercury measurement. With respect to Phase 2, the vendor feedback is that they would like to test their instruments at a full-scale facility. The AMS Center has been approached by DOE to use its TSCA incinerator in Oak Ridge, TN. Massachusetts has also offered the use of one of its coal-fired utilities. Finally, a municipal waste incinerator in Florida has shown some interest in hosting the test. It is unclear at this time which one of the sites will be used for the test. Battelle may consider conducting a test at each of two separate full-scale facilities for two months each depending upon vendor interest.

Retrospective Review of ETV-AMS (What have we learned and what could we do better?)

The first day concluded with an abbreviated discussion of what the AMS Center could do better based on experience and knowledge gained from the first three years. Stakeholders Rudy Eden and Jeff Cook took an action prior to the meeting to draft up some thoughts on areas where they felt improvements could be made. They stressed that the overall approach the center began with and has used has been valid and that their suggestions are intended to add consistency across verification tests and to ensure that vendors were correctly using their verification statements. Some discussion focused on whether vendors should submit their marketing materials to the AMS Center on some regular basis to ensure the latter. EPA and Battelle AMS Center staff suggested that enforcement was not a role for their respective organizations. Battelle staff indicated that their experience showed that competing vendors tend to police each other. When inappropriate materials are brought to the attention of AMS Center staff, vendors are asked to

cease and desist. Unfortunately, insufficient time was scheduled for this discussion so it was decided to reschedule it for the following meeting in April 2002.

DAY 2 –October 19, 2001

Verification Status: Other Technology Categories

Karen Riggs from Battelle began the day by summarizing the status of verification tests that have just been completed (other than those already reported on) or those that are currently in the pipeline. Results from the second round of optical open-path monitor tests were reported on at the AWMA annual conference in June 2001. These results were also report at EPA's Optical Sensing Workshop in July 2001.

The on-board vehicle emission monitoring test was conducted in May 2001 in Marysville, OH. Battelle is holding off on finishing the report until the vendor pays for the test. It paid half of the verification fee prior to the test and was obligated to pay the second half after the test to cover the cost of writing the report. The committee made some suggestions on how to help the company in providing visibility about the test but still having the company obligated to pay the remainder of the verification fee. Stakeholder Don Stedman offered to be a reviewer of the testing results.

A multi-metal CEM test was conducted on Cooper Environmental Services' device at the U.S. Army's munitions incinerator in Toole, UT. The Army provided in-kind and funding support to this test. A draft report is expected to be prepared by December 2001.

Finally, Battelle plans to expand its testing of portable multi-gas emission analyzers for NO and NO_2 to include other gases – SO_2, CO, and O_2. Don Stedman, Ernie Bouffard, and Tom Logan are the stakeholders involved in overseeing this test.

Mike Gilroy offered to be a conduit to getting information about ETV to STAPPA/ALAPCO.

Discussion of Status and Future Technology Categories

Gretchen Hund from Battelle facilitated a discussion on future technology categories the AMS Center may want to consider for verification. It was recognized that several of the categories recommended for verification at previous stakeholder committee meetings were still on the list. Part of the intent of the discussion was to revisit these categories to determine whether they are all still of high importance and to consider other categories.

Ammonia CEMS for slip application was first discussed and it was confirmed that it still is of high importance. Ernie Bouffard is interested in being one of the stakeholders overseeing this verification test.

Another source need discussed was **stack organic speciation analyzers.** Stakeholders felt that conducting a test of these devices would particularly help the metal casting industry. MACT standards are requiring foundries to have speciation analyzers of HAPs. Stakeholder Cliff

Glowacki knew of an Austrian company with offices in Canada called VNF that should be included in a vendor call. The baseline technology EPA uses as the FRM are absorbent tubes. Cliff recommended talking to the Source Evaluation Society (which is having a conference in April 2002) and talking to Jeff Ryan from EPA/NRML in Research Triangle Park to identify other vendors.

Bio monitors were discussed, given the recent scares from anthrax, as an area the center might want to consider pursuing. Stakeholders discussed the challenges of false alarms and having non-reputable companies trying to enter this market. It was recognized that there were two very different markets – handheld units to be used by first responders and continuous monitoring for indoor environments. Some stakeholders suggested teaming with DOD on tests in this area. It was decided to back-burner this category for testing but to begin discussions with DOD and look for possible vendors.

Satellite-based monitoring systems were raised as a possible category to include in verification tests. An argument was made that having high altitude, tropospheric, information was necessary in understanding chemical composition and exposure. Companies that could participate in such a test are Harris, SAIC, and JPL. Some stakeholders questioned whether there were commercially available devices and whether this category was too research-based and not applied based. The complexity of testing such devices was seen as an issue. The group decided it most appropriate to keep this topic on the list of interesting technologies and perhaps identify a speaker for a future meeting.

Ambient networks for supplying Homeland Security information was mentioned as an area of interest to FEMA and the new Homeland Security office. This could be an area that could be connected to the Water Stakeholder Committee within the AMS Center. Monitoring reservoirs (both the water and fallout into them) is of great concern. Likewise, asbestos monitoring by emergency personnel at disasters was also raised as important.

Continuous formaldehyde ambient monitors was raised as a category of interest due to analysis requirements in the current Photochemical Assessment Monitoring Stations (PAMs) network. Stakeholders interested in stack emissions argued that formaldehyde monitoring is also of interest in stacks, and the suggestion was made to include it as a gas of interest in the call for stack organic speciation analyzers. Stakeholders Roy Owens and Cliff Glowacki offered to determine what vendors existed in the stack area. It was also suggested to put a broad call in *The Monitor*.

Wireless technology to download data was suggested as a need for improving connectivity to monitors to ensure that they are measuring what you want them to and that the data are correctly logged and that telemetry is possible. Vendors mentioned were ESC (who has data software for states to manage air quality data), EMC, and Chessell. The group consensus was to identify an expert in this area and have him/her speak at the next meeting.

Open path monitors is a category that has previously been verified by the AMS Center, but it was suggested to expand the test to include VOCs and formaldehyde. Such monitors could be used at the fenceline around Superfund sites and plants (e.g., refineries). FTIRs like OPSIS and

DOAS would be appropriate. The center needs to question past vendors and determine their interest in participating in such a test.

The group discussed when it was appropriate to **revisit ambient fine particulate monitors**. Stakeholders argued that the center should give vendors a future date for when tests will be conducted so that their R&D efforts can be planned accordingly. Some **speciation vendors** to contact and determine their interest in participating are Anderson (California Air Resources Board purchased one of their devices), Rupprecht & Patashnick (R&P), and Porter. An argument was also made for testing **nephelometers** given their affordability for states. Stakeholders suggested that at least four to 5 commercial nephelometers were available. Judy Chow offered to give Battelle the names of nephelometer vendors. Anderson, Radiance, and DRI (its photoacoustic device) were mentioned as companies that could **measure black carbon** – a compound worth including in future tests. Stakeholders felt that a future winter test site should be identified and used that is colder than Fresno, CA. The stakeholders thought the range of commercial nephelometers available would make a good concise test. Susan Wierman stated that nephelometers used near the Atlantic coast did not operate will due to marine air. Tim Hanley reiterated that the three ambient monitoring areas of most interest at the national level were ozone, PM, and air toxics. A date of late 2002 was suggested as the soonest the center would be ready to revisit testing in this area.

What Could ETV do to Better Encourage Vendor Participation?

David Welsh, the Executive Director of the Northwest Environmental Business Council, gave this presentation. He was also asked to describe his outreach efforts to vendors and how well it is working. David mentioned that at least 50% of his members have at least visited the ETV website and 100% of them know what ETV is. He recommended that ETV (or the individual centers) consider publishing in Engineering News-Record (ENR), which is well read by the vendors with applied technologies. He suggested reaching out to groups like the Environmental Industry Coalition of the Northwest. The three elements of most concern to vendors are cost versus value, timeliness, and relevance. In the end, vendors want to know what financial return they will receive from investing in a verification statement from ETV. David felt that ETV was now well positioned, with 164 technologies verified to date, to promote the program to the vendor community. It has a successful proven product to sell.

Technologies for Mold Detection

Stakeholder Lindene Patton from Zurich North American gave the last presentation of the day. She described what is a fungus and why mold is a concern because of health effects. VOCs are produced when the mold spores are reproducing and microtoxins are released. She argued that quantitative risk assessments are now impossible. With recent lawsuits (e.g., in Texas) insurers won't write policies and property coverage is getting difficult. Possible health effects of bioaerosol exposure are infectious and inflammatory diseases (e.g., organic dust toxic syndrome, chronic bronchitis, hypersensitivity pneumonitis, asthma, rhinitis, and conjunctivitis) and systemic effects (e.g., disruption of cellular function and interaction with DNA).

Proving that effects are from a mold is difficult. Individuals seen as at high risk are farmers, those with a family history of allergic disease, asthmatics, immune-suppressed individuals, and infants. Only seven medical case studies have been conducted on human health effects from molds. Most of these dealt with Stachybotrys. The science is lacking to really understand dose and response relationships.

The types of samples taken are:

- Air (viable (cultural, Andersen N6) and non-viable (cultural and non-cultural)-spore trap)
- Bulk (actual bulk material (e.g., drywall, carpet, wallpaper))
- Surface (cell-o-tape, swabs, and wipe)
- Dust (vacuum).

The three types of analyses are using cultures, microscopic exams (qualitative sticky tape, direct exam, and spore counting), and non-culture analyses of the future (beta 1, 3-D-glucan, ergosterol, microbial VOCs, and polymerase chain reaction (PCR)).

A major take-away message from Lindene's presentation was that there are no true "real-time" monitoring devices for mold except for the possible exception of non-viable spore trapping, micrometers (surfaces only), aerosol monitors, and ultra-fine particle counters. Purechoice's PureTrac System uses "electronic sensors or 'noses' placed strategically throughout a building that feed air quality readings to an on-site data interface. The sensors detect and monitor five critical variables: temperature, relative humidity, carbon dioxide, carbon monoxide, and odors/gases."

Major challenges are dealing with confounders (e.g., plant and animal molds), understanding all of the unstudied molds (there are 20,000 plus species), determining what data would be most useful, and knowing if what you are being exposed to is really harmful.

Stakeholders felt that inviting someone from the American Industrial Hygiene Association to talk at the next meeting might help the committee decide if there is an appropriate area for ETV to play in verifying mold detection technologies.

Closing

Gretchen Hund and Karen Riggs thanked all of the stakeholders and observers for attending the meeting and contributing so much to the program. The meeting finished at 12:00 noon and the committee agreed to re-convene in either the Atlanta, GA or Jacksonville, FL vicinity on April 25 and 26, 2002. Future meetings will likely be held every nine months in the future.